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AVIATION

DECEMBER 18, 1922 Issued Weekly PRICE 10 CENTS

Using the Internal Energy of the Wind: Three Gliders Aloft

VOLUME XIII

Number 25

SPECIAL FEATURES

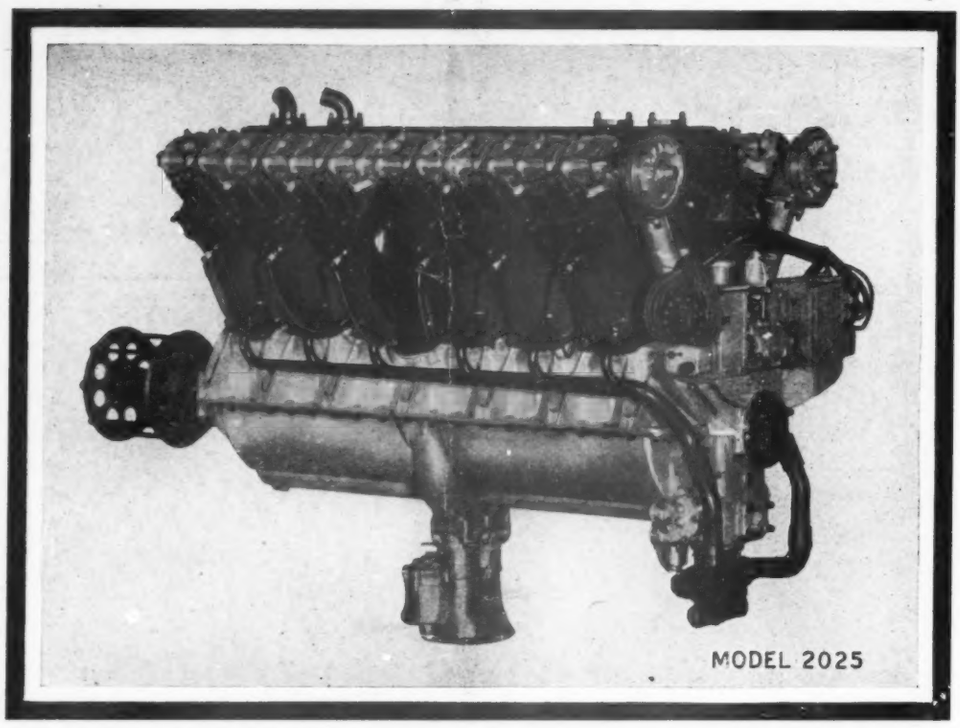
THE AUTOCARTOGRAPH

AIR APPROPRIATIONS FOR NEXT YEAR

ADMIRAL MOFFETT'S REPORT ON NAVAL AVIATION

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y.



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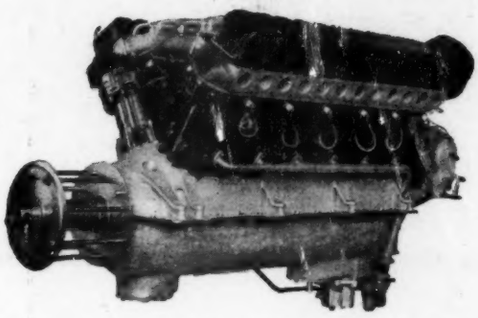

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DECEMBER 18, 1922

AVIATION

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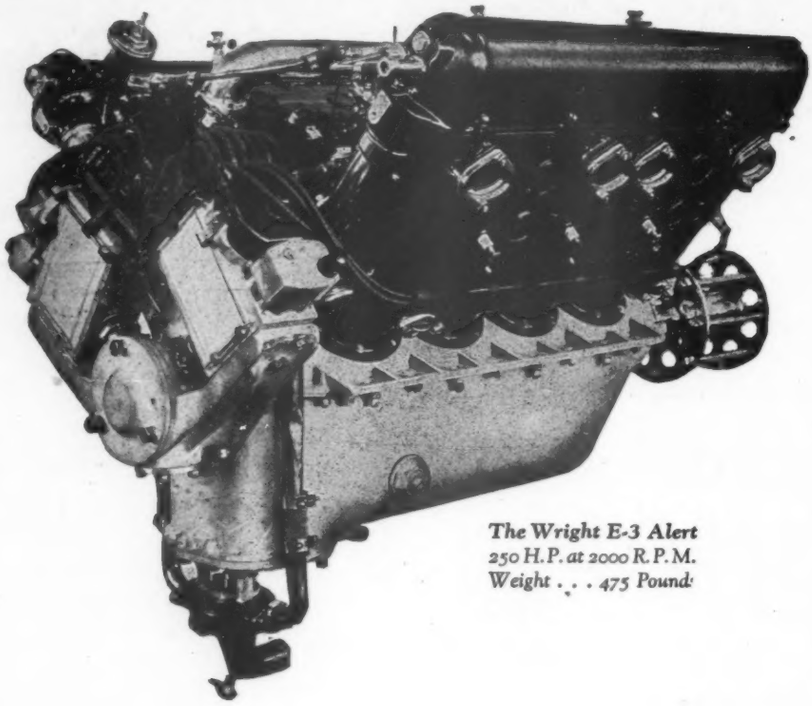

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Vol. XIII DECEMBER 18, 1922 No. 25

General Pershing on Air Power

THE general awakening as to the necessity of a strong air force in the Army and the Navy among the higher authorities during the last year is indicated by the encouraging emphasis laid by General Pershing on the requirements of the country for preparedness for air defense. Until recently the general impression has prevailed that the General Staff of the Army has been unimpressed by the arguments presented to it for adequate aerial equipment. With General Pershing's unequivocal statement it would appear that now there can be expected a greater development of the Air Service.

In the Navy, the gains in the last year have been very notable. The conversion of two battleships into aircraft carriers, the installation of catapults on capital ships and the development of specialized equipment have all been an indication that the Navy is aware of the danger from the air.

What is needed by both branches of the national defense is a realization of the necessity for preparation in advance for emergencies. Aircraft and trained personnel cannot be secured in quantity after the outbreak of hostilities. Such preparation must be made in time of peace. And the cost of such provision is only a fractional part of the expenditures required for tardy equipment and training.

Two methods are obvious. The maintenance of an aircraft industry that has sufficient work to keep it going on a minimum scale is fundamental. To do this, there must be encouragement of the two kinds of companies, those that are specialized in engineering development, and those that are able to manufacture on a production basis. Sets of blue prints with complete specifications to turn over to manufacturers of other products have never brought results in a reasonable time or were of great value in an emergency.

The other and equally important requirement is trained pilots. While commercial aviation would provide a reserve of pilots, it is generally recognized that the mere ability to fly is only a minor part of the knowledge required by a military aviator. The encouragement of reserves and the national guard air units is the most economical method of securing trained personnel.

If General Pershing's public announcement will give the Air Service that cooperation and support it needs from the whole Army, it will have been another great step toward air preparedness.

A Sound Policy

THE National Advisory Committee for Aeronautics in its annual report for 1922 has given expression to a national aeronautical policy that will commend its soundness to every well informed citizen. It follows:

Aviation has been proven indispensable to both the Army and the Navy. Neither can operate effectively without an adequate air service. What was considered adequate in the World War will not do in the future. There must be a greater proportion of aircraft of all types, and they must all be of the most modern design. For this latter purpose, the committee emphasizes the need for continuous development. As the types and uses of aircraft for military and naval purposes differ in important particulars, the War and Navy Departments must continue to have charge of aircraft developments for their respective services. Appropriations for aviation in the Army and Navy should in the interests of national defense be ample, now and at all times, to provide for continuous development. While it is possible that other and older branches of the two military services may have reached the periods of their greatest development, this is certainly not so with aeronautics.

While public sentiment is demanding reduction of the Army and Navy to a prewar basis, it is the judgment of the National Advisory Committee for Aeronautics that it does not demand that the air services of the Army and Navy be so reduced, nor even that they be reduced proportionately with other branches of the Army and Navy. The novelty of warfare in the air, the lack of civil aeronautical activities upon which to draw in time of need, the rapid developments in aeronautics that are taking place in other countries, the absolute necessity of aviation for national defense, and other factors all combined, have led the people to the support of a policy of progress and development in the aeronautical branches of the Army and Navy, however much they may insist upon the curtailment of other military and naval expenditures.

The increasing relative importance of aircraft in warfare is alone sufficient to justify the expenditure of public funds to aid the development of air navigation on a commercial basis. It has been the history of civilized nations that governments have found it necessary to aid in the development of means of transportation. The wonderful growth of transcontinental railroads in America was greatly aided by land grants from our Government. Progressive European nations are spending large sums, through direct and indirect subsidies, for the promotion of civil and commercial aviation. The practical development of aviation in America will not be realized until the Government gives intelligent support and effective aid, principally by regulating and licensing and by cooperation with the States in the establishment of airways and landing fields.

Extraordinary Bombing

TESTS held as part of the joint Air Service and Coast Artillery maneuvers off Fort Monroe, Va., during November have revealed the wonderful improvement in accuracy attained by the Air Service bombing units.

These latest bombing tests are but another demonstration of the effectiveness of "aerial artillery" in the defense of our coasts, and again point to the fact that given an adequate air force the chances of an enemy fleet coming within effective range of the fixed guns of the coast artillery would be extremely small.

Admiral Moffet's Report on Naval Aviation

Summary of Last Year's Progress Gives Comprehensive Outline of Organization

The report submitted to Congress in connection with the Naval Appropriation Bill, covers naval aviation for the period from July 1, 1921, to June 30, 1922, although the Bureau of Aeronautics did not come into existence until Sept. 1, 1921.

The Bureau of Aeronautics

The following organization has carried on the duties devolving upon the Bureau of Aeronautics since its establishment:

(1) The chief of bureau.

(2) The assistant chief of bureau.

(3) Four principal divisions: (*a*) Plans. (*b*) Administration. (*c*) Material. (*d*) Flight.

During the past year a reorganization of the fleet air squadrons has been effected—an aviation force for each fleet has been provided. Each force has been organized with the aircraft squadron as a basis.

The squadrons attached to the Atlantic air squadrons consisted of Scouting Squadrons 1 and 2 and Torpedo Plane Squadron 1. Scouting Squadron 1 and 2 were merged into one squadron and as such were operated from December until the end of the year. This combined squadron consisted of 6 F5L and 2 NC seaplanes. Torpedo Plane Squadron 1 consisted of 10 PTP seaplanes for torpedo work and 1 F5L seaplane for general utility.

The air squadrons, Pacific Fleet, consisted of the U.S.S. Aroostook (mine layer) as flagship and tender, the U.S.S. Gannet (mine sweeper) as auxiliary tender, Spotting Squadrons 3, 4, and L1, Combat Squadrons 3, 4, and L1, and Seaplane Patrol Squadron 1. The allowed complement of Spotting Squadrons 3 and 4 and Combat Squadrons 3 and 4 was 18 planes each. Combat Squadrons L1 and Spotting Squadron L1 were not commissioned during the year, due to lack of personnel. Seaplane Patrol Squadron 1 consisted of 6 F5L seaplanes.

On June 17, 1922, the Chief of Naval Operations issued a revision of the organization of naval aviation; this revision changed the names of the air squadrons, Atlantic Fleet and Pacific Fleet, to aircraft squadrons, scouting fleet and aircraft squadrons, battle fleet, respectively. In addition to the change in titles there were also changes in the composition of these two organizations. The names of the squadrons assigned to each fleet under this order are as follows:

Aircraft squadrons, scouting fleet:
- Scouting Plane Squadron 1.
- Torpedo and Bombing Plane Squadron 1.
- Kite Balloon Squadron 1.

Aircraft squadrons, battle fleet:
- Torpedo and Bombing Plane Squadron 2.
- Observation Plane Squadron 1.
- Observation Plane Squadron 2.
- Observation Plane Squadron 3.
- Fighting Plane Squadron 1.
- Fighting Plane Squadron 2.
- Fighting Plane Squadron 3.

Air Bases and Air Stations

Throughout the year the following aviation shore activities were maintained:

(1) For support of operations of fleet aircraft squadrons:
- Naval air station, San Diego, Calif.
- Naval air station, Hampton Roads, Va.
- Naval air station, Coco Solo, Canal Zone.
- Naval air station, Pearl Harbor, Hawaii.

(2) For training personnel for aeronautic duty:
- Naval air station, Pensacola, Fla.
- Aviation mechanics' school, Great Lakes, Ill.
- Post graduate detail.

(3) Inactive coastal patrol stations:
- Naval air station, Chatham, Mass.
- Naval air station, Cape May, N. J.
- Naval air station, Rockaway, Long Island, N. Y.

(4) Miscellaneous:
- Naval air station, Anacostia, D. C. (for experimental work).
- Naval air station, Lakehurst, N. J. (rigid airship construction).
- Naval aircraft factory, Philadelphia, Pa.
- Naval air detail, Newport, R. I. (experimental torpedo work).
- Naval air detail, Dahlgren, Va. (experimental torpedo work).

(5) An inspection service covering all production and aircraft accessories manufacturing plants under contract to the Government.

(6) Helium plant at Fort Worth, Tex., operated in conjunction with United States Army Air Service.

OFFICER PERSONNEL ON ACTIVE AVIATION DUTY JULY 1, 1921, AS COMPARED WITH JULY 1, 1922

	July 1, 1921.				*July 1, 1922,*
	Regular.	*Tempo-rary*	*Naval Reserve.*	*Total*	*regular Navy.*
Naval aviators	72	44	254	370	314
Student naval aviators	63	34	5	102	61
Line ground officers	53	24	31	108	105
Staff ground officers	—	—	—	—	115
Total	188	102	290	580	595

ENLISTED MEN ON ACTIVE DUTY JULY 1, 1921, AS COMPARED WITH JULY 1, 1922

	Regular Navy.	
	July1,1921.	*July1,1922.*
Aviation ratings	3,494	2,209
General service ratings	1,385	2,422
Total	4,879	4,631

The following table shows the total flying hours per unit ashore and afloat, and the total number of hours for the entire Navy during the past year:

FLIGHT OPERATIONS, UNITED STATES NAVY AND MARINE CORPS, FOR FISCAL YEAR ENDING JUNE 30, 1922

HEAVIER-THAN-AIR CRAFT

Station.	*Flights.*	*Hours.*	*Minutes.*
NAVY.			
Atlantic Fleet	2,462	2,775	43
Pacific Fleet	9,290	6,905	35
Anacostia	2,329	1,287	13
Coco Solo	1,337	968	25
Dahlgren	258	273	24
Great Lakes	172	62	40
Hampton Roads	3,107	2,516	33
Newport	205	144	45
Pearl Harbor[1]	575	447	35
Pensacola	15,749	13,266	—
San Diego	3,989	2,931	35
Langley detachment	1,620	757	13
Total	41,093	32,336	46
MARINES			
Guam[1]	401	429	25
Parris Island	145	95	37
Port au Prince	1,967	1,661	30
Quantico	3,800	2,744	50
Santo Domingo	1,778	2,078	34
Total	8,091	7,009	56
Total Navy	41,093	32,336	46
Total Marines	8,091	7,009	56
Grand total	49,184	39,346	42
AIRSHIPS.			
Hampton Roads	88	133	55
Pensacola	61	45	40
San Diego	132	119	10
Total	281	298	45
KITE BALLOONS.			
Atlantic Fleet	348	77	20
Coco Solo	16	4	10
Pensacola	3	2	15
Total Navy	367	83	45
Marines at Quantico	1	11	45
Grand total	368	95	30

[1] Report for the month of June not included.

FREE BALLOONS.

Station.	Flights.	Hours.	Minutes.
Pacific Fleet	1	—	45
Hampton Roads	1	23	45
Pensacola	3	30	10
San Diego	6	12	45
Total	11	67	25
Total for all types and stations for year.	49,848	39,808	22

Plans for Future as Affecting this Year's Operation

When it became apparent that the terms of the naval disarmament treaty would require the scrapping of the battle cruisers which were then under construction in the shipyards of this country, the department decided that two of these cruisers should be completed as aircraft carriers. This matter was submitted for the consideration of the Disarmament Conference.

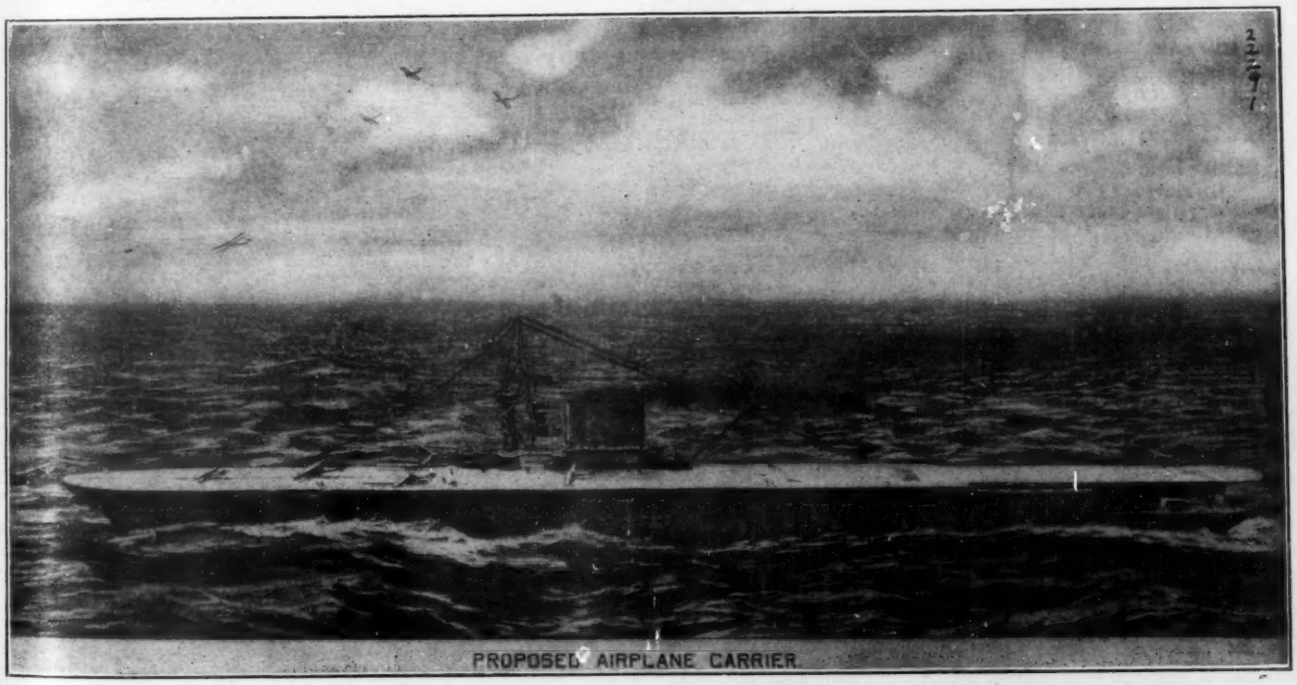
The plan was finally approved and work was commenced on changes of design necessary to equip and fit out these ships as suitable aircraft carriers. This entailed an enormous amount of design work in order to obtain suitable interior arrangements for the maintenance, stowage, and handling of aircraft and aircraft material, and to provide as nearly as possible a clear upper deck for launching and flying on of aircraft.

Encouraging Design

The Bureau of Aeronautics has followed the policy of encouraging design and invention outside the naval service, but has taken great care to maintain a sufficiently expert design staff so that the Navy would never be entirely dependent upon or forced to accept only such designs as might be submitted by contractors. In the same way, while the procurement of aircraft is normally handled by contract after competitive bidding, the war showed the necessity for controlling the production of a portion of the Navy's requirements for aircraft, and the naval aircraft factory was created and has been maintained in an active, but reduced, operating status. Since the armistice this plant has only been operated at a fraction of its capacity, and the space so made available used for storage of surplus aircraft material. It is the general base storehouse for all naval aircraft material, and with the reduction of the number of air stations it has been necessary to unload on the aircraft factory large quantities of material left over as a result of war-time activities. The naval aircraft factory furnishes a place where repair, overhaul, and emergency work can be handled promptly; where experiments of a confidential nature can be undertaken under the direction of naval personnel; and where the manufacture from time to time of standardized aircraft may be undertaken in order to obtain reliable information as to cost. The saving due to construction at the aircraft factory has been appreciable, and the construction there of certain standard types has served to check any possible tendency of contractors to maintain high prices in spite of the evident decrease in labor and material markets. It is the bureau's policy to encourage aircraft manufacturers in every practicable way, but at the same time to authorize a sufficient amount of production at the aircraft factory to safeguard the Government's interests relative to cost and time of construction, and to stabilize the labor turnover.

Since the armistice there has been a relatively great change in naval aeronautics. During the war every effort was made to produce aircraft for countersubmarine work and for convoy and patrol duty. This led to the development of large flying boats and non-rigid airships. These types now exist in a fairly satisfactory state of perfection, and attention has been diverted from them to the development of aircraft suitable for use with the fleet. The *raison d'être* for the Bureau of Aeronautics and all of its activities is to furnish to the fleet proper types of satisfactory construction for naval aerial development and use. Fleet aviation requires small and handy combat planes of high performance to be carried with the fleet; planes for scouting, observation, and spotting gunfire; and torpedo and bombing planes for offensive use against an enemy fleet. The development of these types has been pushed vigorously throughout the year, and there are actually in existence today a number of designs which the bureau believes give great promise of fulfilling the needs of the fleet. These types are undergoing tests under service conditions, and such of the types as satisfactorily comply with service requirements are being put into production as rapidly as possible.

Simultaneously with the development of special aircraft for fleet work, the problem of carrying these planes with the fleet has received consideration. It is obvious that aviation can be of only slight assistance to the fleet until such time as it can accompany the fleet to any part of the world. In home waters, large flying boats working from harbors and bases on shore have proved serviceable, but in order to carry fighting, spotting, and torpedo planes with the fleet it is necessary either to carry the planes on regular ships of the fleet, or on special aricraft carriers. It is appreciated that carrying



Wash drawing of the new type of aircraft carriers with electric propulsion which are being built for the U. S. Navy by conversion of two battle cruisers scrapped by the Washington treaty on limitation of armaments. The power plant will be furnished by the General Electric Co. of Schenectady, N. Y.

aircraft on warships involves many difficulties, due principally to the necessity for making no serious compromise with the fighting efficiency of the ship. This requires that fleet aircraft be small and compact. It has not only been proved possible but also entirely practicable to launch planes by means of catapults, and the installation of these catapults has been authorized by the department on various types of ships, and some of these installations have already been satisfactorily made; others are under way and the work is proceeding as rapidly as practicable under existing conditions. It is not yet practicable to provide sufficient deck space for planes to return again to the regular ships of the fleet. This requires that these planes must either be designed as seaplanes to alight on the water or they must alight on the flush deck of an airplane carrier. Work on the Langley has progressed sufficiently to indicate that this vessel will prove of great value as an experimental airplane carrier from which much needed data will become available for use in connection with the design and construction of the capital ship airplane carriers authorized by the Congress. It is confidently believed that during the coming year a large number of fleet aviation problems can be worked out in service with the Langley.

Experimental and Research Work

Experimental and research work was actively pushed during the year along the following principal lines:

(a) Improvements in catapults for launching airplanes from ships; arresting gear for landing airplanes on ships; braking devices, flotation gear, and miscellaneous equipment for ships' planes.

(b) Metal construction for airplanes.—The rapid deterioration in service of the present wood and fabric construction for airplanes is aggravated by tropical conditions, and it is hoped that metal construction can be satisfactorily used in lieu of the present wood and fabric material.

(c) Ship plane development.—In order to obtain from practical tests information as to what is the most satisfactory type of ships' combat plane upon which to concentrate development, experimental single-seater planes of various types have been constructed, or are under construction at the present time. These include a pusher flying boat, a tractor flying boat, a tractor airplane, and a tractor seaplane.

(d) Amphibious gear.—The bureau is proceeding with the development of an amphibious plane which can land upon and get away from either a ship's deck or the surface of the sea.

(e) Aerodynamic efficiency.

(f) Handley-Page patent.—As noted in the last annual report of the Chief of Bureau of Construction and Repair, the Handley-Page patent was acquired jointly by the Army and Navy. It is expected that by the use of slotted wings covered by this patent naval aircraft can be made more compact and better adapted for handling aboard ship.

ZR1.—The ZR1 is under construction at the naval aircraft factory, Philadelphia, and the naval air station, Lakehurst, N. J. The fabrication of most of the material is under way at Philadelphia, and the actual assembly and construction is being carried on at Lakehurst. After many delays due to appropriations for lighter-than-air, the construction of this airship is now proceeding satisfactorily. It is estimated that about 53 per cent of the construction work of this ship was finished as of July 1, 1922, and it is believed that this ship will be ready to go in commission during the summer of 1923.

ZR3—Bureau representatives have opened an office at Friedrichshafen, Germany, at the works of the Zeppelin Co., to whom has been assigned by the German Government the construction of a 70,000 cubic meter rigid airship, which is to be delivered to the United States Navy at Lakehurst, N. J., by a German crew. This rigid airship, to be obtained without cost, represents the latest developments of German rigid airship construction, and the bureau believes that the successful conclusions of these negotiations is one of the most important of its accomplishments during the past year.

Procurement of Aircraft

Aircraft were delivered during the past fiscal year as indicated by the tables. It is noted that domestic manufacturers supplied only 37 planes, while 52 were delivered by the naval aircraft factory. This situation is entirely inconsistent with the status of orders as of July 1, 1922, where domestic manufacturers have on order and undelivered 153 planes and the naval aircraft factory 41 planes.

AIRCRAFT PROCURED DURING FISCAL YEAR 1922

Heavier-than-air from domestic manufacturers:	
K4 seaplanes, J. V. Martin	3
CT seaplane, Curtiss	1
EM seaplanes, Elias	7
VE airplanes, Lewis-Vought	6
DT seaplanes, Davis-Douglas	3
MB airplanes, Thomas-Morse	12
CR airplanes, Curtiss	2
VE9 airplanes, Vought	2
AS seaplane, Aeromarine	1
Total	37
Heavier-than-air from naval aircraft factory:	
VE airplanes	24
PT seaplanes	14
TS convertible airplanes	3
PT2 seaplanes	10
TF airplane	1
Total	52
Heavier-than-air from War Department:	
USXB1A airplanes	2
DH4 airplanes	130
JN4 and JN6 airplanes	72
Total	204
Heavier-than-air from foreign sources:	
Fokker torpedo plane	1
Morane-Saulnier airplanes	6
Macchi seaplanes	3
Blackburn Swift airplanes	2
Dornier combat plane (metal)	1
Vickers amphibian airplane	1
Parnall ship planes	3
Dornier flying boat (metal)	1
Total	17
Lighter-than-air from domestic manufacturers:	
D class airship	1
Touring airship	1
Free balloons	3
Kite balloons, 50,000 cu. ft.	8
Total	13
Lighter-than-air from naval aircraft factory:	
Free balloons, 80,000 cu. ft.	2
Lighter-than-air from foreign sources:	
Rigid airship, ZR2 (R38) (lost on trials, never accepted)	1

AIRCRAFT ON ORDER UNDELIVERED JULY 1, 1922

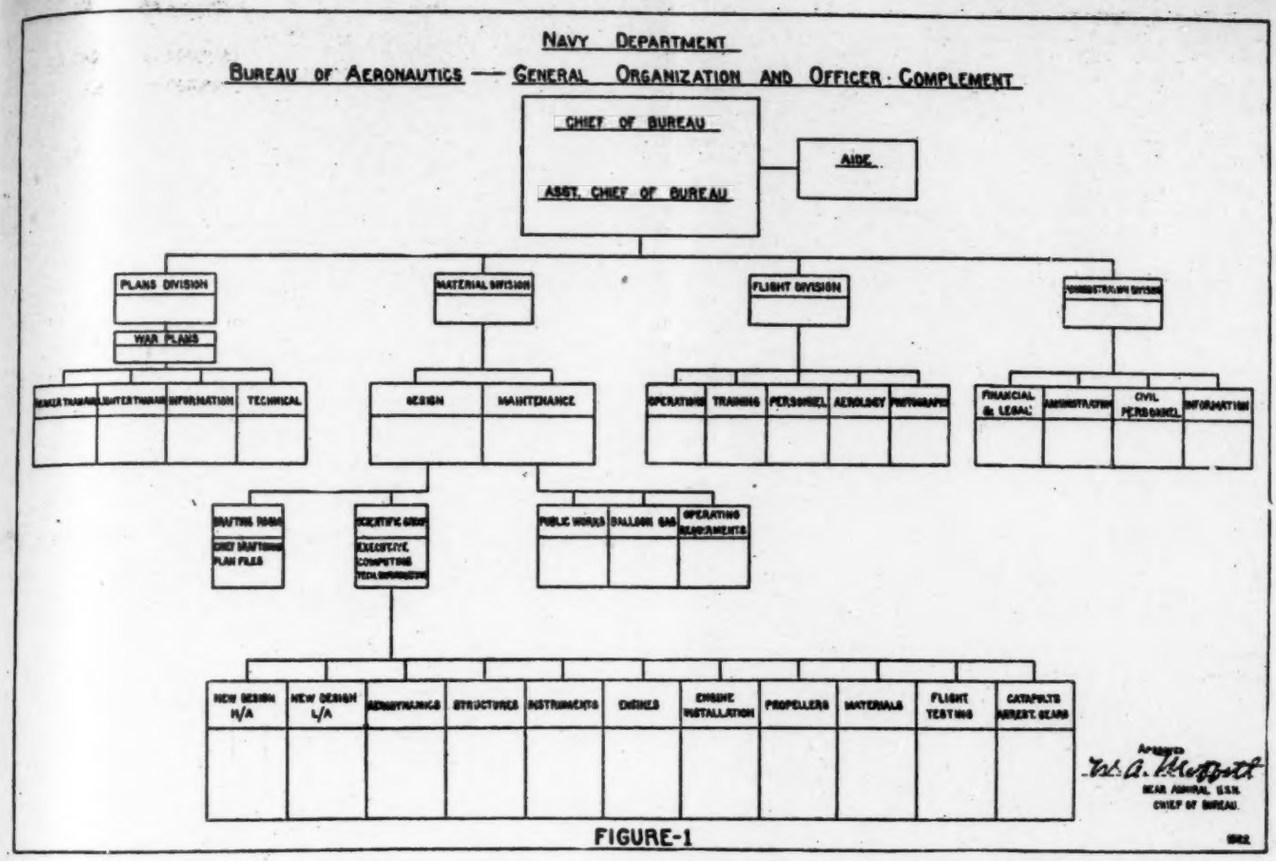
Domestic manufacturers:	
AS seaplane, Aeromarine Plane & Motor Co.	1
ST convertible airplanes, Stout Engineering Laboratory[1]	3
SV airplane, Stout Engineering Laboratory[1]	1
WO seaplanes, Dayton-Wright Airplane Co.	21
TS convertible airplanes, Curtiss Aeroplane & Motor Corp.	34
HN1 seaplanes Huff, Daland & Co.	3
DT2 convertible airplanes, Davis-Douglas Co.	18
BR1 airplanes, Aerial Engineering Corporation	2
MO1 airplanes, Glenn L. Martin	6
M201 airplanes, Glenn L. Martin	3
VE9 airplanes, Chance Vought Corporation	19
UF1 airplanes, Chance Vought Corporation	18
UO1 seaplanes, Chance Vought Corporation	6
CS1 convertible airplanes, Curtiss Aeroplane & Motor Corp.	6
XS1 seaplanes, Cox-Klemin Aircraft Corporation	6
MS1 seaplanes, Glenn L. Martin	6
Total	153

[1] Order to be canceled.

Naval aircraft factory:	
BS seaplanes	2
TS convertible airplanes	7
TR convertible airplanes	2
PT seaplanes	8
TG seaplanes	5
DT2 convertible airplanes	6
VE7 airplanes	9
NM1 convertible airplanes	2
Total	41
Foreign sources:	
FT seaplane, Netherlands Co. Fokker	3
HPS1 airplanes, Handley-Page	3
Heinkel seaplanes, Caspar Werke	2
Total	8
Airships:	
ZR1 rigid airship, Navy Department	1
J class nonrigid airships, Goodyear Tire & Rubber Co.	2
Total	3

Naval Aircraft Factory

As previously indicated, the naval aircraft factory represents one of the most important and vital functions of the aeronautical organization of the Navy Department. It is a



Schematic table showing the organization of the Bureau of Aeronautics, Navy Department

first-class industrial establishment, capable of doing any kind of aeronautical work which may be required by the bureau.

Number of personnel.—

Officers	29
Clerical employees	168
Technical and drafting employees	115
Mechanical (maximum)	1,436
Maximum number of employees at any previous date (Nov. 11, 1918)	3,593

Shipment.—Total value of all aircraft shipped, $4,254,748.17.

Value of material purchased for stock during fiscal year.—As taken from public bills, $724,036.93.

Procurement of Engines

The aeronautical engine industry is included in the great automotive industry and is in an entirely different position from the aircraft industry proper. The bureau has found no necessity for engaging in general engine design. Rather it invites engine builders to submit sample engines to rigid naval tests, and from the failure of engines on test the bureau can insist on modifications, often slight, until the engine gives satisfactory service. The development of aeronautical engines becomes, therefore, a matter of intensive testing, alteration, and testing again until faults are overcome.

The rapid extension of the use of aircraft in naval work has demanded a broad variety of types, and we have found it necessary to develop a complete line of engines to meet all conditions. Types have already been developed, or are now in various stages of development, which will meet all demands, and it is quite safe to say that by the end of the coming fiscal year we will have a complete line of engines—developed entirely under Navy control—which can compete successfully with the best engines in the world. These engines range in power from 60 hp. to 700 hp. and cover the requirements for all types of airplanes, seaplanes, and airships.

Fuel injection engines.—It is accepted generally by aviation authorities here and abroad that one of the most important developments in aircraft power plants is to make practicable the use of heavy oil fuels. This is to say, engines which, like the Diesel engine, will operate successfully on heavy oil for fuel, will inject the fuel directly into the engine cylinders, and which will fire the charge spontaneously, thus eliminating in a large measure at least the first hazard present in the use of highly volatile gasoline for fuel, and avoiding the difficulties inherent in the use of carburetors and complicated ignition devices.

The *only* development work which has been undertaken, or which has met with any success in this country for the application of these principles in aircraft engines, has been initiated, fostered, and largely financed by the Navy. This has been a most difficult undertaking, but although the problem has not been completely solved, tests of experimental engines recently completed indicate the strong probability that the use of this type of engine in aircraft practice will be entirely practicable. The progress which has been made thus far is in advance of any other known development in this country, and is not surpassed by any known development in the world.

Among these are listed the following types of engines which have been developed entirely under Navy control and with Navy funds. Only those types are mentioned which have been built and thoroughly tested and proved, and which can be immediately put into production in large quantities on short notice; and only those types are mentioned whose development has been out of naval appropriations:

Lawrence model J1, 200 hp. air-cooled engine.
Wright model E2, 180 hp. water-cooled engine.
Aeromarine model U8D, 200 hp. water-cooled engine.
Curtiss model CD12, 350 hp. water-cooled engine.
Packard model 1A1551, 300 hp. airship engine.
Wright model D1, 400 hp. airship engine.
Aeromarine model U6D, 130 hp. water-cooled engine.

These engines are all post-war developments, and each engine mentioned is at least the equal of any other engine of the same class that has yet been developed in this country or abroad.

Reduction gears.—The development of reduction gears for aircraft engines has been one of the most difficult problems which has confronted the industry in this country. At the end of the war no suitable type of reduction gear had ever been built in this country, in spite of repeated efforts. Development work has been proceeding in this line under Navy control for three years and for the past year engines fitted with reduction gears have been in successful operation in naval aircraft in everyday flight service. In the course of this work an industry has been developed which can manufacture successful reduction gears for all types of engines.

The post-war record of the Navy in aircraft power-plant development stands as follows:

The Navy has been responsible for the development of the only successful air-cooled engines of American manufacture that have yet been flown.

The Navy has developed every successful engine of American manufacture which has been used in lighter-than-air craft.

The Navy has developed the only reduction gears for aircraft engines that have proved successful in flight operation.

The Navy has been responsible for practically all of the development thus far accomplished toward the use of heavy oil engines in aircraft.

A Navy-developed engine has recently passed the most severe duration test which has ever been completed by any aircraft engine, and Navy-developed engines have proved on test to have a greater operating life between overhauls and greater dependability than any other American-built engines, and are at least equal in this regard to the best engines built abroad.

The Navy has developed the largest aircraft power unit ever built, and has been first in the United States to succeed in gearing two or more aircraft engines to one propeller in a practical manner.

Helium production.—The United States helium production plant No. 1, located at North Fort Worth, Tex., produced 1,841,000 cubic feet of helium during the period from July 1, 1921, to Nov. 30, 1921.

Marine Corps Aviation

Tables of Marine Corps aeronautic organization on shore, covering group, squadron, and division organization for aviation units, are as follows:

First Aviation Group, marine barracks, Quantico.
Observation Plane Squadron 3 (VO Squadron 3).
Fighting Plane Squadron 1 (VF Squadron 1).
Kite Balloon Squadron 1 (ZK Squadron 1).
Observation Squadron 1, Santo Domingo, Dominician Republic.
Observation Plane Squadron 1 (VO Squadron 1).
Observation Squadron 2, Port au Prince, Haiti.
Observation Plane Squadron 2 (VO Squadron 2).
Scouting Squadron 1, Sumay, Guam, Marianas Islands.
Scouting Plane Squadron 1 (VS Squadron 1).

The following indicates the distribution of the Marine Corps aviation personnel:

Stations.	*Commissioned.*	*Warrant.*	*Enlisted.*
Headquarters United States Marine Corps	4	—	—
Bureau Construction and Repair (test pilot)	1	—	—
Santo Domingo City, Dominican Republic	5	1	104
Port au Prince, Haiti	7	1	100
Quantico, Va.	17	6	371
Flight "L," Sumay, Guam, Marianas Islands	7	1	92
Paris Island, S. C.	1	—	13
Great Lakes, Ill.	—	1	20
En route to different stations	5	—	36
Naval air station, Pensacola, Fla.	9	—	6
Post-graduate course, United States Naval Academy	4	—	—
	60	10	742

Appropriations and Expenditures

The appropriation bill for the naval service for the year ending June 30, 1922, carried under the appropriation, "Aviation, Navy," a total of $13,413,431. This was a very drastic reduction from the appropriation of previous years, the 1920 appropriation having been $25,000,000 and the 1921 appropriation $20,000,000. The reduction from 1921 was thus approximately 33 per cent.

The expenditures for the various purposes included in the appropriation are shown in the following table.

Purpose.	*Appropriated.*	*Expended.*
For aircraft and accessories in course of construction or manufacture on June 30, 1921	$440,000.00	$428,468.70
For new construction and procurement of aircraft and equipment	5,328,000.00	5,113,219.81
For navigational, photographic, and aerological equipment, including repairs thereto, for use with aircraft built or building on June 30, 1921	49,250.00	33,304.27
For maintenance, repair, and operation of aircraft factory, helium plant, air stations, fleet activities, testing laboratories, and for overhauling of planes	4,534,181.00	5,850,211.87
For continuing experiments and development work on all types of aircraft	1,615,000.00	1,624,505.28
For drafting, clerical, inspection, and messenger service for aircraft stations	275,000.00	229,471.45
New construction, buildings, and improvements at air stations	1,177,000.00	1,147,564.19
Balances transferred account July 12, 1921	1,800,000.00	1,319,817.77
Total	$15,213,431.00	$14,746,558.34
Balance		466,872.66

NOTE.—Table based on S. and A. statement of June 29, 1922.

New Foreign Air Chiefs

Recent cabinet changes in Great Britain and in Italy have resulted in the appointment of new men to the posts of government aviation offices of these countries.

In Great Britain Sir Samuel Hoare was appointed Secretary of State for Air, and the Duke of Sutherland Under-Secretary of State for Air. Sir Samuel has not previously been associated with aeronautics. The Duke of Sutherland was president of the Air League of the British Empire at the time of his appointment.

In Italy the advent of the *fascista* cabinet resulted in a reorganization of the government aviation offices. It was originally planned to create an under-secretariat of aeronautics, for which post Deputy Aldo Finzi, an aviator well known and one of the principal exponents of Italian air power, was slated. But as Signor Finzi was entrusted with the ministry of the interior, it was decided to create instead a division of military aeronautics and a division of civil aeronautics, both being attached to the ministry of war. Gen. Giorgio Douhet was appointed military air chief, and Chev. Arturo Mercanti civil air chief.

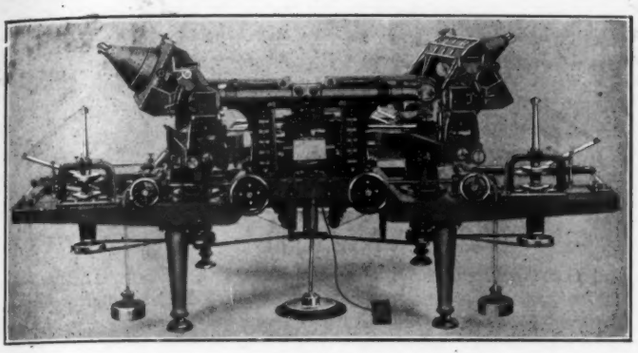
General Douhet is one of the oldest Italian aviators, having obtained an aviator's certificate in 1910. Two years later, when he held the rank of major, he was placed in command of the aviation battalion of the Italian army. In this connection he exerted strenuous efforts to improve Italy's aeronautical equipment, without however succeeding in overcoming the inertia of government bureaus. As he had made himself many enemies through his unceasing propaganda work in behalf of a strong air force, he was transferred in 1915 from the army air service to a field army, and in 1916 he was court-martialled, condemned to one year's detention in a military prison, and retired for having expressed to the Italian Premier views on the conduct of aerial war which were at variance with those of the High Command. After the disaster of Caporetto, in 1918, he was, however, appointed director of military aviation in the general commissariat of aeronautics headed by Deputy Chiesa, but he resigned shortly afterward when he found himself unable to carry out the reorganization of the Italian air forces owing to the general policy pursued by the government. General Douhet has since published a remarkable essay on aerial warfare, called *Il Domino dell'Aria* (Command of the Air), in which he shows with implacable logic how the advent of aircraft will radically alter the form of warfare of the near future, emphasizing the necessity of organizing a strong independent air force for offensive operations distinct from the auxiliary services of armies and navies. An English translation of this book is now being undertaken, and will probably appear next spring.

Chevalier Mercanti has the reputation of a great organizer. He has been for years president of the Italian Touring Club, in which capacity he contributed much to the organization of cycling, automobile and motor boat events. During the war of 1914-18 he served in the Italian army air service, and after the armistice he commanded a squadron which made a propaganda flight from Italy to Athens and Constantinople.

The Hugershoff Autocartograph

Ingenious Apparatus Simplifies Process Of Map Drawing from Aerial Photographs

By Dr. Alfred Gradenwitz



General view of the Autocartograph, invented by Prof. Hugershoff

While the great economical importance of accurate surveying is generally acknowledged, it will perhaps come as a surprise to many that only about 20 per cent of the surface of our earth has so far been adequately surveyed. The remaining 80 per cent comprise not only such regions as from an economical point of view are mostly of less importance (the interior of South America and arctic North America, for instance), but even, among others, the whole of the Central and South American coast districts. Though the rapid preparation of accurate maps of all these countries becomes an ever more urgent necessity, methods so far available are far too slow and inefficient to allow this task to be solved.

While photogrammetrical methods, based on photographing the ground with special aparatus, greatly reduce the amount of work to be done on the spot, the office work connected therewith is all the longer, the recovering of angles from photographic pictures and gradual construction of the map requiring considerable time. Moreover, such methods have been found to be suitable only in cases where points of reference are available in sufficient numbers, that is, only in high mountain ranges with readily accessible peaks. Attempts have been made to provide a sufficient number of points of reference by taking photographs from an airplane or airship, but the uncertainty with regard to the actual position of the aircraft and additional difficulties in converting the aerial photographs into actual maps so far prevented this method from being used in actual practice. It was left to Dr. Hugershoff, professor of Geodesy at the Dresden Technical College, to overcome these difficulties.

Dr. Hugershoff at first devised some special methods of calculation and special instruments enabling the determination of those points of reference to be carried out in a minimum of time and with remarkable accuracy, primarily using a computing theodolite, which, after the photographs have been taken, mechanically records the point of reference (standpoint), as well as the various inclinations of the plate to the horizontal. While a triangulation net with broad meshes otherwise is absolutely essential to obtain accurate results, any necessity of providing for triangulation points is done away with by the Hugershoff method.

Description of the Apparatus

A further step toward reducing the process to a series of merely automatic operations has been taken by devising, in addition to this theodolite, a machine termed *auto-cartograph* which enables any two aerial photographs of the same section of ground (partly overlapping) to be used automatically and without any further calculation for the mapping out of the region in question.

The apparatus mainly constitutes a gigantic precision stereoscope designed on special principles and combined with a drawing mechanism. After inserting the two views into the apparatus, the operator on looking through the eye-piece sees a perfectly plastic model of the section of the ground, as well as a movable gage mark (likewise of plastic appearance), which, by acting on several hand-wheels—from the operator's seat, can be shifted along roads, streams, coast-lines, woods, etc., thus tracing automatically and with remarkable accuracy on a sheet of drawing paper any topographic lines passed over by the gage mark. A special scale enables the altitude of any point thus traced to be read, but provision is made as well for keeping the gage mark, if desired, invariably at points of a given altitude. If the gage mark then, by means of the hand-wheels, be allowed continually to slide along the model of the ground as seen in the eye-pieces, it is bound to follow the course of a level line, thus transferring these lines to the map in the same manner as the topographical lines just referred to. Moreover, the operator can cut out of the plastic model any vertical section desired and transfer it to sheets of drawing paper arranged sideways.

A special feature of the Hugershoff apparatus is the possibility of using for surveying purposes aerial photographs taken in any possible direction and at any inclination desired.

Aerial surveying according to the Hugershoff process is performed as follows:

An airplane manned by a pilot and an observer flies over the section of ground to be surveyed in parallel directions, the approximate altitude and distances depending on the scale of the map to be prepared. During the flight the ob-

Map based on photogrammetrical views, automatically drawn by Prof. Hugershoff's Autocartograph

server operates about every half minute Prof. Hugershoff's special aero-topographic camera, taking views at an angle of inclination of 30 deg. to the ground and, if possible, at right angles to the direction of flight.

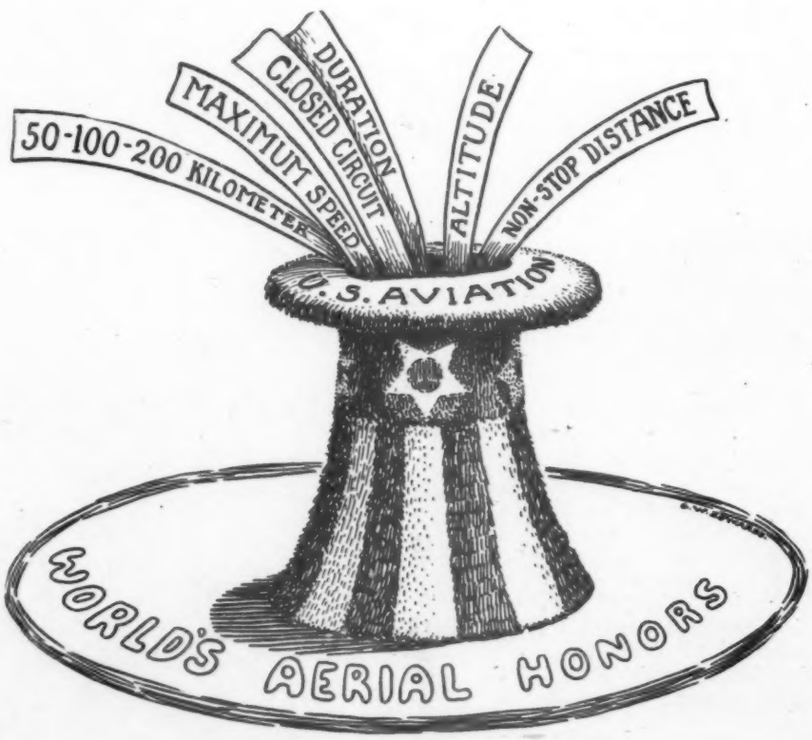
This having been done, the plates are developed and copied. The prints, in connection with existing triangulation points, are used to determine for each pair of plates the exact situation and altitude of three distinctly visible points on the photograph. The operator next proceeds to locate the place of the aircraft at the moment the respective photographs were taken and to ascertain the angle of inclination with the aid of the computing theodolite above referred to. After that, each two successive photographs (original negatives or diapositive glass plates) are introduced into the auto-cartograph, in order there to be used in building up the map out of topographical situation and level lines, as above described.

In order to be able to reproduce the greatest possible wealth of details, it is advisable to take special views with a camera fitted to the airplane in a perpendicular position, independently of the photographs above mentioned, which are taken at an angle. The most suitable outfit to be used in this connection is the Messter Series Topograph, which, by producing a series of successive views automatically from the airplane, affords an excellent idea of the approximate configuration of the ground, allowing the various items on the map to be located in a very short time. When such details are necessary in order to ascertain the local names and details on the map or to analyze the nature of the soil, for instance, in connection with road and railway construction, one of the surveyors will have to take a walk through the country, collecting these data.

As regards the accuracy of this method, actual experience has shown the average errors of points thus ascertained at a height of 1600 meters not to exceed a variation of ±1.5 meters in the perpendicular or horizontal direction, which, of course, is quite sufficient for any topographic purposes. Moreover, this remarkable accuracy corresponds to each point of the network of situation and level lines drawn automatically, whereas in the case of terrestrial topography these lines are obtained by interpolation and visual appreciation. This is why the quality and uniformity of terrestrial surveying depends to a very high degree on the reliability and training of the staff, whereas maps automatically drawn by means of the mapping machines are much less dependent on the efficiency of the staff.

Interesting results were obtained at a competition held under the auspices of the Saxon Board of Survey, where Dr. Hugershoff conclusively proved the superiority of the new method over the old one. A rather hilly country in the Erzgebirge mountains was surveyed concurrently by the old and the Hugershoff method, when the two maps were found perfectly to agree both in an horizontal and vertical direction, though the new method afforded an average saving of time of 60 per cent quite apart from the saving of hands and additional advantages.

Our Hat is in the Ring



Air Appropriations for Fiscal Year 1923-24

$29,311,450 Asked for Army, Navy and Air Mail

The total of appropriations allotted in the budget for the fiscal year ending June 30, 1924, the three government air services—Army Air Service, Naval Aviation and Air Mail Service—is $29,311,450.

Army Air Appropriation

The total allotments for the Army Air Service for 1924 are $12,871,500 as against $12,895,000 for the present fiscal year

The general appropriations recommended for Air Service schools, employees, equipment, airplanes, balloons, spares, experiments, etc. is set down as $12,671,300 compared with $12,700,000 for the current year.

For aviation seacoast defenses in Insular Possessions, specifically a machine shop in Hawaii, $10,000 is asked, and for departmental salaries $190,200. This brings the total to $12,871,500.

Naval Air Appropriation

The Bureau of Aeronautics, Navy Department is allotted the sum of $14,789,950 compared with the sum of $14,803,560 for 1923. This appropriation is apportioned as follows:

For aviation, navigational, photographic, aerological, radio and miscellaneous equipment, including repairs for use on aircraft built or building on June 30, 1923, $275,000;

For maintenance, repairs and operation of aircraft factory, helium plant, air stations, fleet activities, testing laboratories, and for overhauling of planes, $6,290,000, including $350,000 for equipment of vessels with catapults;

For continuing experiments and development work on all types of aircraft, $1,600,000;

For drafting, clerical, inspection and messenger service, $710,000.

For new construction and procurement of aircraft and equipment, $5,798,950;

In all $14,673,950, provided that no part of appropriation shall be expended on maintenance of more than six heavier-than-air stations on the coasts of the United States, and that no part of the appropriation shall be expended for construction of a factory for the manufacture of airplanes.

For salaries for employees of the Bureau of Aeronautics, $52,000, and for salaries of draftsmen and technical experts, $64,000, making a total of $116,000, which with above item of $14,673,950 makes a grand total of $14,789,950.

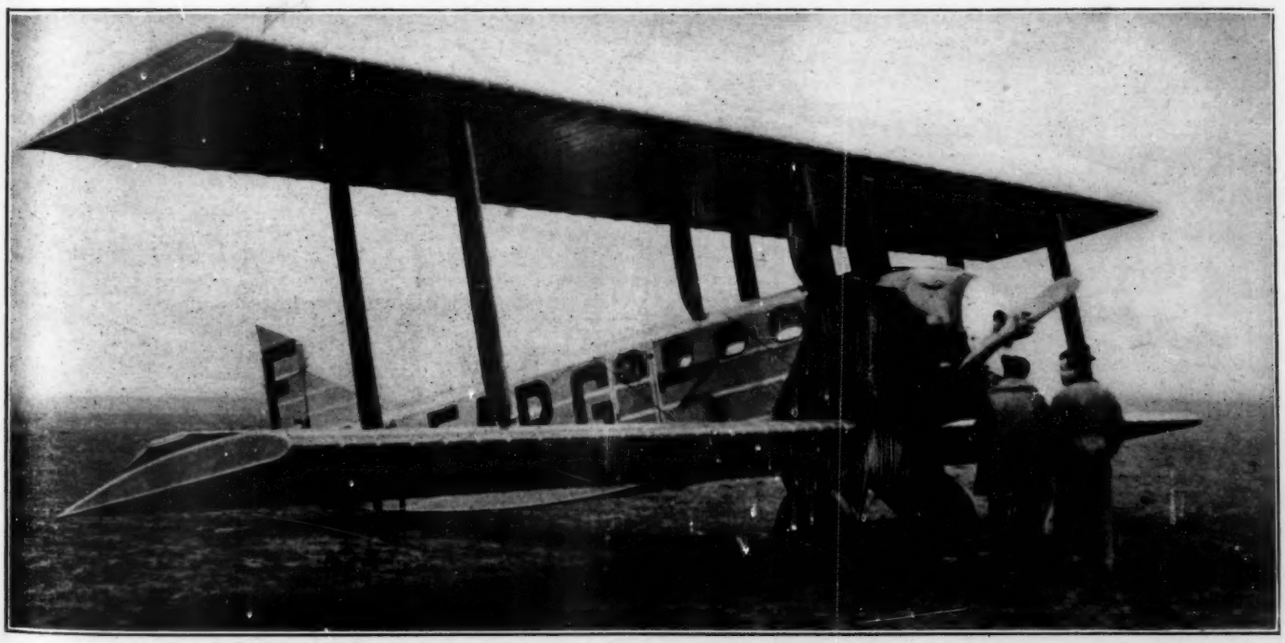
Estimates of the expenditures and obligations are shown to be $14,984,154. Estimated expenditures for 1923 are $14,683,950, and estimated expenditures for 1924, $14,673,950.

Air Mail Appropriation

In the Post Office appropriations recommended by the Budget Officer there also appears an item for $7,000,000 for the transportation of foreign mails by steamship, aircraft and otherwise, with the proviso that not in excess of $150,000 be expended for the carrying of foreign mails by aircraft.

The bulk of the Air Mail budget estimates for 1923-24 are under the allotments for the Second Assistant Postmaster General where an item of $1,500,000 appears for the operation and maintenance of the airplane mail service between New York and San Francisco, via Chicago and Omaha, including incidental expenses and the employment of necesssary personnel. The figure for the current year was $1,900,000. Estimated expenses for the next fiscal year give $797,274 for personnel service, and $707,726 for service including rent, gas, field improvements, supplies, etc. but the estimated expenses for the current year are shown as a total of $1,852,524.

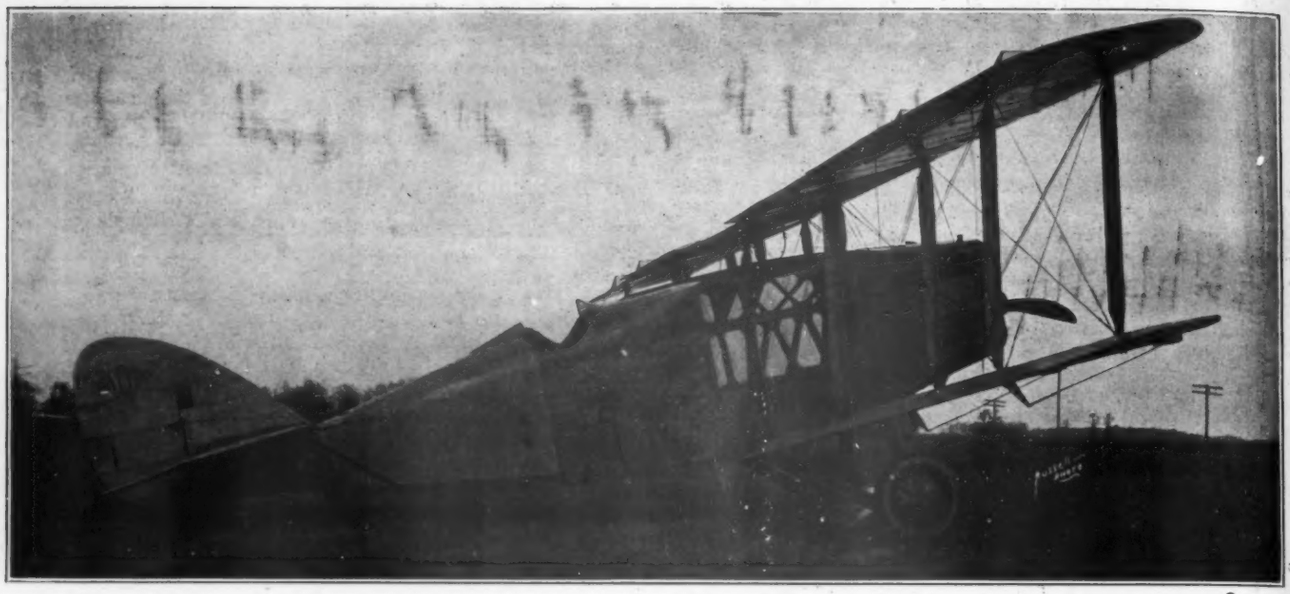
New French Commercial Airplane



The Farman F90 5-passenger cabin ship (300 hp. Salmson) which won the air transport competition for the Grand Prize of Paris. The clean and powerful lines of this ship are notable

"Sattco" Six-Passenger Commercial Airplane

New Liberty Engined Cabin Biplane an Interesting Development



General view of the "Sattco" six-passenger commercial airplane (350 hp. Liberty low compression Navy type)

The "Satteo" 6-passenger cabin airplane was designed and constructed at the plant of the Service Aviation Co., Wabash, Ind., by O. L. Woodsin, under the supervision of J. P. Porter.

The machine has been under continual test performances since it was completed and attended the National Airplane Races at Mt. Clemens, Mich., where it created much interest in aeronautical circles.

The general specifications of the "Sattco," as this ship is called, are as follows:

Type: Cabin biplane carrying six passengers and pilot. Pilot's cockpit is located on top and at the rear of cabin, insuring good visibility.

CHARACTERISTICS

Span of upper main planes, 43 ft. 6 in.
Span of lower main planes, 43 ft. 6 in.
Chord of upper and lower main planes, 5 ft. 6 in.
Span of undercarriage plane, 5 ft. 3 in.
Chord of undercarriage plane, 3 ft. 2 in.
Angle of incidence of all planes, 3 deg.
Gap at fuselage, 6 ft. 11¾ in.
Gap at wing tips, 5 ft. 6¾ in.
Stagger, 11¾ in.
Dihedral of upper main planes, none
Dihedral of lower main planes, 5 deg.
Overall height, 11 ft. 10¾ in.
Overall length, 30 ft. 2 in.
Wheel track, 7 ft.
Total wing area, 480 sq. ft.
Engine, Liberty
Total horsepower, 400
Weight empty, 2711 lb.
Weight loaded, 3790 lb.
Weight loaded with gas, oil, pilot and passengers, 4671 lb.
Weight per sq. ft. of lifting surfaces, 9.6 lb.
Pay load, exclusive of gas, oil, for 500 miles, and pilot, 180 lb., 1040 lb.
Length inside, 6 ft. 11 in.
Width inside, 3 ft.
Height inside, 5 ft. 7 in.

Performance

Max. speed, 125.7 m.p.h.
Min. speed, 83 m.p.h.
Landing speed, 45 m.p.h.
Landing speed, 6000 ft. 8.3 min.
Climb, 10000 ft. 15 min.
Climb, 15000 ft. 35.5 min.
Absolute ceiling, 17000 ft.

Constructional Details

Some of the noteworthy features embodied by this plane are its simplicity of design, comfort of passengers, with plenty of windows for viewing the country. It is upholstered in rich velour, with deep spring cushions which make it very comfortable. It takes off in 700 ft., with full load, and lands very slowly, insuring safety on small fields. The pilot has excellent visibility in every direction. The plane is equipped for wireless communication. The cabin is so constructed that it is almost fire and sound proof. It is equipped with telephone, to communicate with the pilot, and ventilation and heating system that can be controlled by the passengers at will.

The spars are the "I" beam type, and are made of selected Oregon spruce. Ribs are made of veneer, with a spruce cap strip, with the exception of the compression ribs, which are the box type. At present the wing used is the RAF15 aerofoil, but later the plane will be equipped with a special high lift wing, which is being designed. This will give a slower landing speed and considerably more lift.

The fuselage is covered with 3/16 in. veneer back to rear of pilot's cockpit, and from there on it is covered with linen. Interior bulkheads are made of seventeen ply 1 in. veneer, which makes it very solid. Cabin windows are of 5/32 in. pyralin. The cabin has a side door entrance.

The undercarriage is made of nickel steel tubing, and is streamlined with balsa wood. It is very light and strong.

The empennage consists of an adjustable stabilizer, which can be adjusted by the pilot while in the air, and to this are fastened the elevator flaps. It has a balanced rudder, with sufficient area to insure complete control. The rudder is operated by a foot control bar; the lateral and longitudinal control is operated by a stick.

New Gliding Prizes

A prize of one thousand guineas (approximately $5,000) has been offered by Gordon Selfridge, of London, for the first flight by a sailplane which will exceed a distance of 50 miles. The competition will be open from Jan. 1 to Dec. 31, 1923.

André Michelin, the French tire manufacturer, has put in competition a prize of 15,000 francs (approximately $1,500) which is to be awarded the French pilot flying a French sailplane who first covers a distance of not less than 20 kilometers with an angle of descent having a tangent not less than 1/12.

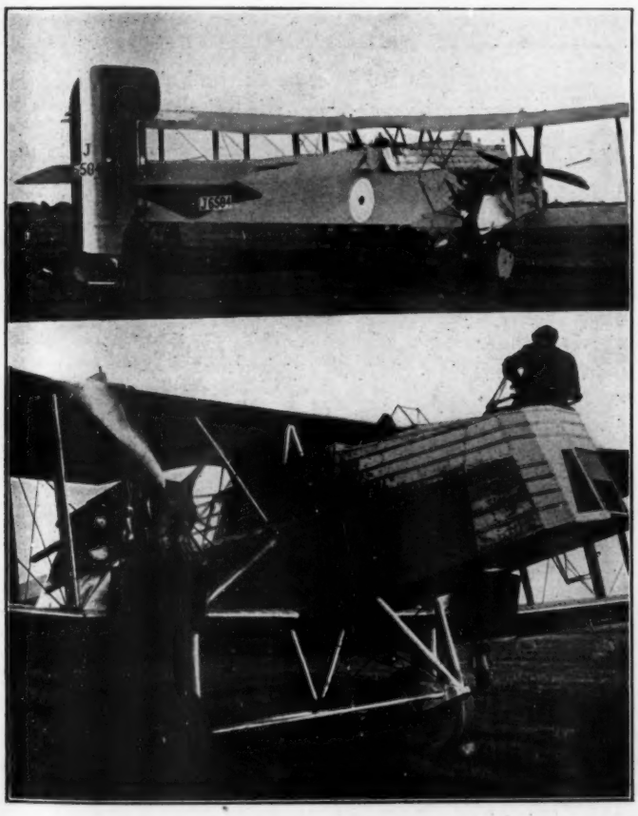
The Boulton & Paul "Bolton" Metal Bomber

New Twin-Engined Biplane for Royal Air Force

The Boulton & Paul "Bolton" or Model P15 metal bomber which is summarily described herewith by courtesy of *Flight* is a development of the Boulton & Paul "Bourges" twin-engined bomber which this firm produced toward the end of the late war. As the new ship is built for the British air ministry, only a scant description has been authorized and no figures are available, although the accompanying photographs give a good idea of what the machine looks like. Nor is any information to be had on the really interesting features of the new ship, namely the all-metal construction (except for the covering) in which steel is used to a very large extent.

Developed from the "Bourges"

Although the "Bolton" bears a certain family resemblance to the famous "Bourges," it differs from the earlier machine not only in size, but also in several other important respects. The power plant consists of two 450 hp. Napier "Lion" engines, mounted fairly high in nacelles carried on the lower plane. As the question of efficient cooling is one about which comparatively little is known, it is of interest to note that in the "Bolton" the Napier engines are left uncovered to an unusual extent, with the consequence that radiators of relatively small size can be employed. A further advantage of this arrangement is that the exhaust silencers, which are of the patented Boulton and Paul type, with aluminum manifolds terminating in steel pipes having saw-cuts in them, are very efficiently cooled. In spite of their simplicity and lightness, these silencers are very effective, and it appears probable that the combination of exposed engines and small radiators offers no more resistance than enclosed engines with large radiators and complicated exhaust pipe arrangements.



(c) Central News

Two views of the Boulton & Paul "Bolton" all-metal bomber which is equipped with two 450 hp. Napier "Lion" engines

Another feature noted in connection with the engines is the absence of vibration. When both engines were running all-out on the ground it was not possible to detect any vibration of the lower plane, a fact for which no doubt the special design of engine mounting is responsible. One of the interesting features of this ship is the unusual starting arrangement. Instead of mechanics having to climb about on the machine in order to reach and turn the starting handle, arrangements are made in the "Bolton" for starting the engines from the ground, long shafts running from the engines, inside the nacelles, down to the tail end of the nacelles, where a starting handle can be inserted and the engines turned over by a mechanic standing behind the trailing edge of the lower plane. Not only is this position very comfortable and allows of maximum effort being applied, but should the mechanic slip his foot he will not go through a plane or damage some important part, as is apt to occur in machines where the mechanic has to stand on a wing or other part.

The fuel system consists of main tanks mounted in the fuselage with pumps (driven by windmills) constantly delivering to a feeder tank, also mounted in the fuselage, but at sufficient height to give gravity feed to the carburetors. Thus there is no fuel in the engine nacelles, while unsightly gravity tanks, externally mounted, are avoided.

The Wing Structure

The wings are of usual form as regards their external appearance, but are, like the rest of the machine, built entirely of steel, with exception of the covering, which is the usual doped fabric. It would of course, be possible to make the covering of metal also, but it is thought that the extra weight which this would entail would outweigh any advantage arising out of metal covering. The ailerons are of the type in which the hinges are placed some distance back from the leading edge, the balance being formed by the forward third of the aileron and not by a horn balance projecting forward outside the wing tip.

Several interesting features are incorporated in the tail. Thus in addition to the usual trimming tail plane, a trimming fin has been employed, which works in a manner similar to the trimming tail plane, its sideways displacement having for its object to equalize any turning moment set up by one engine developing less power than the other. As soon as the pilot discovers that one engine is dropping its revolutions, he turns a wheel in the cockpit and the fin moves over until the machine has no tendency to turn. The rudder is hinged to and moves over with the trailing edge of the fin.

The undercarriage is of a special oleo type, and from observation of the machine taxiing and landing it would appear that the shock-absorbing qualities are extraordinarily good, no tendency to bouncing being noticeable. In addition to the two main wheels a third and smaller wheel is placed centrally and some distance ahead of the main undercarriage. This wheel prevents the machine from nosing over in a bad landing, and is partly enclosed in a streamline casing. It is sprung by rubber shock-absorbers.

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250 m.p.h. Air Speed Indicator

The tremendous speeds attained by the planes in the Pulitzer Trophy race necessitate the use of Air Speed Meters of higher range than any heretofore in service. The Pioneer Instrument Co. has added to its line of Air Speed Meters a new model of 250 m.p.h. range, which was installed on all the Army entries. The indicator is of the same general appearance as their lower range instruments, and operates from a Pito-Static Tube. The total weight of the indicator and tube is less than one pound.

8th Annual Report of N.A.C.A.

President Harding Endorses Recommendations for a National Aeronautical Policy

Endorsing the National Advisory Committee for Aeronautics' plea for the fostering of aeronautic development in this country, the President has forwarded the eighth annual report of the N.A.C.A. to Congress with the statement that: "The constructive recommendations therein contained for the advancement of aeronautics deserve the thoughtful consideration of all members of the Congress."

In presenting the eighth annual report of the National Advisory Committee for Aeronautics to the President, Dr. Charles D. Walcott, Chairman of the Committee, points out that the contributions of the Committee to the science of aeronautics have placed America in the forefront of progressive nations in aerial navigation. "In the art of aviation there has been substantial progress in the design and performance of military and naval types of airplanes, but commercial aviation has made very little headway," he states, adding that this is due, not so much to the inherent problems and difficulties of air navigation, nor to the lack of technical knowledge, as to the lack of airways, landing fields, and Federal Regulation and licensing of aircraft and operators. Calling attention that the development of world transportation both by rail and road has depended largely on governmental aid, Dr. Walcott states that aircraft will prove even more revolutionary than railroad and automobile development. "In the opinion of the National Advisory Committee for Aeronautics," he explains, "it is necessary and proper that the Federal Government should aid in the development of air navigation by providing Federal regulations and establishing airways and landing fields."

A policy for the development of aeronautics as a national asset beneficial in time of peace as well as in time of war, is outlined in the Committee's report. The relative importance of aviation in war alone is said to be of sufficient importance to justify the expenditure of public funds to aid the development of aerial navigation on a commercial basis. The history of civilized nations shows, the report states, that governments have found it necessary to aid in developing all transportation systems, and that today the progressive nations of Europe are spending large sums, through direct and indirect subsidies for the promotion of civil and commercial aviation. Without asking financial assistance for the art, the report states that the practical development of aviation in America will be realized only when this Government gives intelligent support and effective aid, principally by regulating and licensing airplanes and pilots, and with state cooperation in establishing airways and landing fields.

A National Aeronautical Policy

Briefly, the National Aeronautical Policy recommended provides that:

Aeronautics has already exerted a great influence on civilization, its necessity in military operations being definitely established, although its adaptation to commercial purposes has scarcely commenced.

Lack of restriction of aircraft development by the Limitation of Arms Conference, is believed sufficient to assure greater relative importance in future warfare on both land and sea.

Practical application of aviation in Air Mail Service within a few years, is one of the marvels of the age. Each improvement in transportation is known to have lightened man's labors, increased his prosperity and broadened his knowledge of his fellow man. The continuance of the service is recommended.

With the help of well-directed scientific research, with the imagination of the people fully aroused, and with comprehensive, helpful legislation, aeronautics will yield, in peaceful pursuits its real contribution to the progress of civilization.

Scientific research in aeronautics is said to be the most important subject in the field of aerial navigation development; the Army and Naval services depend upon the work of the Committee for the solution of the more difficult problems in the fundamental art of flight, which is the prescribed function of the Committee. The urgent need for ample funds and facilities with which to complete the execution of a research program already approved, is explained.

Federal regulation of aviation, with state cooperation, is urged by the Committee, which also recommends the creation by law of a bureau of civil aeronautics under the Department of Commerce.

Although public sentiment seems to be urging the reduction of the Army and Navy to a pre-war basis, it is the judgment of the Committee that the public does not demand that the air services of those arms be so reduced, nor even that they be reduced proportionately with the other branches of the Army and Navy. The novelty of aerial warfare, the lack of civil aviation activities from which to draw in time of need, the rapid development of aeronautics in other countries, and the necessity for aviation in national defense, have led the people to support a policy of progress and development in aeronautical branches of both the Army and Navy, however much they may insist upon curtailment of other military expenditures, it is claimed.

The Committee urges the development of our helium extraction methods and the conservation of this unique supply of non-inflammable lifting gas, through the acquisition of the fields and the sealing of the wells.

The development of aerological service along transcontinental airways, when established, is requested, and the authority for the extension of this work by the Weather Bureau is urged, as without an aerological service, it is explained, there can be no safety in the air nor progress in commercial aviation.

Aerial Camera Aids Reconstruction Work

"The aerial camera is taking an economical and highly important part in the reconstruction of the devastated areas of France and in the restoration of the arid regions of Egypt and Mesopotamia, which in ancient times were the centers of civilization," said Sherman M. Fairchild, president of the Fairchild Aerial Camera Corp., on his recent return from Europe.

"It is stimulating to learn that America leads the major European nations in the scientific development of aerial photography, but in the practical application of the art on a national scale we must look to France as the leader. The French, since the ending of the war, have systematically set about the development of aeronautics through utilization of every service offered.

"Shortly after the Versailles treaty was signed, a French law was passed requiring every city in the republic, above a certain size, to be resurveyed within three years. It would have been physically impossible and financially impracticable to accomplish this by ground methods. The result was that mapping by air was adopted throughout, and one company alone surveyed 200 cities from airplanes.

Aerial mapping is being extensively used by the ministry of liberated regions. The areas of France devastated during the war are being resurveyed from the air, as in many cases not only were property lines obliterated, but the records of entire communities destroyed.

"The City of Paris was mapped from the air to a scale of 200 ft. to the inch, thus making it possible to identify even small buildings. Corrections such as new structures, streets, etc., were printed in red over the existing maps. For this air mapping work the French company received the equivalent of $400.000."

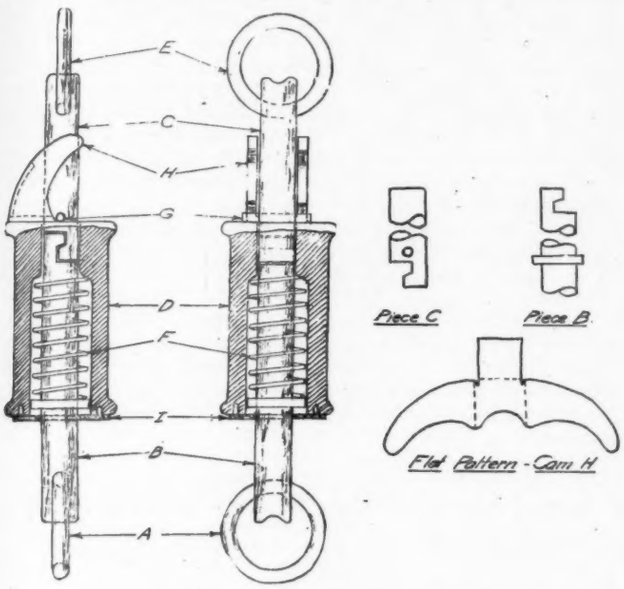
Mr. Fairchild believes that a rich field for development in aerial photography awaits American companies entering Central and South America, and such European countries as Spain, Greece, etc.

Greater Safety for the Parachute Jumper

Device to Eliminate Many of the Dangers of Parachute Landing

The development of a suitable release for the jumper upon reaching the ground has been of paramount importance in overcoming the many difficulties in producing a safe parachute. The importance of getting clear of the parachute at the time of reaching the ground may easily be appreciated, for serious injury might be sustained by the jumper were he to be dragged along the ground before he could release himself from the parachute. There is also the danger of being pulled into a tree, a building, or any other obstacle.

In the older types of parachutes it was the custom for the jumper to unfasten his retaining straps on nearing the ground



Quick-release gear for parachute landings

in preparation to dropping out of his harness at the exact instant of landing. Of course, this meant a rather difficult operation under most trying circumstances.

Due to the fact that the jumper will probably have heavy gloves on, and since he will surely be cold and stiff from his jump, it is essential that a simple, easy working, release be devised. It must be fool-proof; it must be sure and quick acting so that there will be no possibility of snagging or jamming at the critical moment; it must be simple and an easily operated mechanism; it must be rugged in order to resist the severe jerking loads which will be put upon it; it must also be comparatively light in weight.

Many devices have been invented with these ends in view, but most of them have some inherent defect which makes their use dangerous. One familiar type is operated by rotating a small cylinder through an angle at the moment release is desired. The weight of the jumper exerts a pull on the release hook, thus causing friction on the surface of the cylinder which makes it difficult to rotate the cylinder when desired. It is next to impossible to open it speedily if the jumper's hands are gloved in addition to being stiff and partially numb.

Description of the Release Mechanism

With all the foregoing points in mind the release hook described in this article has been developed. It has been fully tested and shows that it easily fulfills the foregoing requirements.

The load due to the weight of the jumper is transmitted from the jumper's harness to the lower ring *A* to which the harness is permanently attached. The ring *A* is fastened to piece *B* which is a machined piece of 3½ per cent nickel steel. It is machined as shown in Fig. I, and the hook end is then hardened by heat treatment. Pieces *B* and *C* grip each other in the manner shown so that it is impossible to pull them apart when the aluminum sleeve *D* is in the position shown. Piece *C* is also machined from 3½ per cent nickel steel, and its hook end is also heat treated in order to resist wear due to constant use. Ring *E* is attached to piece *C*. The parachute lead is attached to ring *E*. Spring *F* rests upon the collar which has been turned on piece *B*, and the spring exerts pressure on the internal shoulders of sleeve *D* as shown. Consequently, the sleeve *D* will be held up so that it jams pin *G* which has been pressed into a hole drilled in piece *C*. Cam *H* is rigidly attached to sleeve *D*. Washer *I* is attached to sleeve *D* by machine screws as shown.

It may be seen that if a tension load be applied to the rings *A* and *E*, it will be transmitted to the pieces *B* and *C*, and thence carried through the hardened locking jaws. The degree of the slope of the locking jaws is such as to cause the jaws to tend to slide slowly on each other when a tensile load is applied to the pieces *B* and *C*. This means that there will be very little thrust, and hence very little friction to be overcome in sliding sleeve *D*. It was found by test that sleeve D could easily be moved against the action of spring *F* when the load was on the release.

To release the jumper it is only necessary to slide sleeve *D* down and thus depress the spring *F* until the upper surface of the sleeve *D* clears the lower surface of the locking jaw of piece *C*. Then, due to the slope of the locking jaws, the piece *C* will slide out from the piece *B*, and the connection between the jumper's harness and the parachute would be broken. If, due to corrosion, or to any other unforseen cause, the piece *C* should stick to piece *B*, the cam *H* would contact with pin *G* and thus throw piece *C* away from piece *B*. The design is such that contact is made between pin *G* and cam *H* an instant after the locking jaws are cleared by the sleeve *D*. After the connection is broken the sleeve *D* is thrust out by the spring *F* until the washer *I* jams against the collar on the piece *B*. In this way the release is held together so that no parts are lost, and so that there is no danger of the jumper being struck by the recoiling spring.

If after landing it is desired to recouple the jumper's harness and the parachute it may be easily done by depressing sleeve *D* and locking the jaws of pieces *B* and *C*. Then the sleeve *D* is allowed to come up until it jams against pin *G* when the release is ready for use once more.

Aerodynamic Properties of Thick Aerofoils

N.A.C.A. Report No. 152

This investigation by F H. Norton and D. L. Bacon was undertaken by the National Advisory Committee for Aeronautics as an extension of N.A.C.A. Report No. 75 for the purpose of studying the effect of various modifications in a given wing section, including changes in thickness, height of lower camber, taper in thickness, and taper in plan form with special reference to the development of thick, efficient airfoils. The method consisted in testing the wings in the N.A.C.A. 5-foot wind tunnel at speeds up to 50 meters (164 ft.) per second while they were being supported on a new type of wire balance. Some of the airfoils developed showed results of great promise. For example, one wing (No. 81) with a thickness in the center of 4.5 times that of the U.S.A. 16 showed both a uniformly higher efficiency and a higher maximum lift than this excellent section. These thick sections will be especially useful on airplanes with a cantilever construction.

A copy of Report No. 152 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

The biographical sketches of men who are prominent in American Aeronautics are printed periodically in AVIATION. The first series have been published in a more durable form, and revised issues will be published from time to time to take care of the frequent changes in station of Army and Navy officers, and such other changes as may occur. As errors and omissions are liable to occur in a compilation of this character, interested parties are requested to notify "Who's Who" Editor of the necessary corrections so the record may be kept up to date.

Leslie James McClurg

McCLURG, LESLIE JAMES, Roentgoenologist; born, Ogdensburg, New York, May 23, 1895; son of James A. McClurg and Isabella (Simpson) McClurg.

Educated: Graded schools; Wolcott High School; Mechanics Institute, Rochester, N. Y., 1912-1915; University of Michigan, 1915-1917.

Professional: Victor Electric Co., Chicago, Ill., 1917; Fidelity X-Ray Laboratory, 1919-1922; Prof. Marquette University, 1919-1922.

Aeronautical Activities: Entered 5th Missouri National Guard June 6, 1917; transferred to Air Service, Fort Sill, Aug. 1917; training as Aerial Observer, sent to Garden City, L. I. Dec. 1917; ordered overseas Jan. 1918; training in France in Air Service, Tours, Samur, Chatillon-Sur-Seine, Cazeau; assigned to 12th Aero Squadron for active duty, June 1918; saw service on following fronts: Luneville and Bacrat sector, Chateau-Theirry (record battle of the Marne), St. Mihiel sector, Argonne; Army of occupation Dec. 1919; returned and discharged Mar. 23, 1919.

Flying Rating: Aerial Observer.

War Service: Army, Aviation Section, Aug. 1917 to Mar. 23, 1919.

Honors: Citation from General Pershing; Recommendations for D. S. C. Oct. 17, 1918 to Sept. 18, 1918; Croix-de-Guerre, No. 14734, July 30, 1918; Chateau Thierry Sector: "accomplished important photographic mission in spite of repeated attacks of enemy."

Member: Aero Club of Wisconsin.

Present Occupation: Director, Fidelity X-Ray Laboratory.

Address: 114 Grand Ave., Milwaukee, Wis.; home, 176 12th St., Milwaukee, Wis.

Hugh Laussat Willoughby

WILLOUGHBY, HUGH LAUSSAT, Aeronautical Engineer; born, Solitude, Del. Co., N. Y., 1856; son of Sam C. A. Willoughby and Estelle (Laussat) Willoughby; married, Augusta de P. Harrison, 1878.

Educated: St. Johns Military Academy; Nice, France; University of Pennsylvania, 1877.

Professional: President, Willoughby Airplane Co.

Aeronautical Activities: Made first Airplane models from photographs of soaring birds taken on the Southern Coast of Florida in 1894; graduated U. S. Naval War College, 1896; assisted Orville Wright in his first flight, Washington 1908; built "The War Hawk", 1909; this machine was the first biplane tractor ever built, first machine that could be started by a crank from the aviator's seat, and first machine to use Willoughby Patent Rudders; holds fourteen patents on airships; Director of Flying at Belmont Park and Atlantic City Meet and Congress; built and flew airplanes from 1909 to date.

Books Written: "Across the Everglades."

Member: Society of Automotive Engineers; Aero Club of Pennsylvania; New York Yacht Club.

Present Occupation: President and Aeronautical Engineer, Willoughby Airplane Co.

Address: Port Sewell, Fla.; (Summer home, Newport, R. I.)

Charles Franklin Kettering

KETTERING, CHARLES FRANKLIN; son of Jacob Kettering and Martha (Hunter) Kettering; married, Olive Williams, Aug. 1, 1905.

Educated: Country District School; High School; Normal School; Ohio State University, M.E. & E.E. 1904.

Professional: Inventor starting, lighting and ignition systems known as "Delco"; also "Delco-Light" isolated lighting systems.

Aeronautical Activities: Invented ignition system used on Liberty Motors during war; has flown own ships for past several years.

War Service: Acted in consulting capacity on various airplane developments with government.

Member: Advisory Board, Aviation Country Club.

Present Occupation: President, General Motors Research Corp.

Address: Dayton, Ohio; home, Ridgleigh Terrace, Dayton, Ohio.

Van Hampton Burgin

BURGIN, VAN HAMPTON, Life Insurance; born, Greensboro, N. C., Sept. 6, 1897; son of Frank Alexander Burgin and Jennie Chilton (Reinhardt) Burgin; married, Lousie Speer, Feb. 25, 1920.

Educated: Public schools; Georgia Inst. of Tech., 1919, Architecture.

Professional: Goodyear Tire & Rubber Co., Sept. 1919 to Oct. 1920; Phoenix Mutual Life Insurance Co., Oct. 1920 to July 1921; Union Central Life Insurance Co., July 1921 to Sept. 1922; General Agent, Southern States Life Insurance Co., Atlanta, Ga., Sept. 1922 to date.

Aeronautical Activities: Georgia Inst. of Tech. Ground School, Oct. 1917 to Dec. 21, 1917; Kelly Field No. 2; Camp Dix for two weeks; sailed for France, Mar. 28, 1918; in St. Mihiel Drive, shot down and taken prisoner, Sept. 26, 1918; during the Argonne Drive, officially credited with the destruction of two enemy machines.

Flying Rating: Reserve Military Aviator.

War Service: 2nd Pursuit Group, 13th Aero Squadron, A. E. F.; St. Mihiel Drive, Sept. 12, 1918; Argonne Drive, Sept. 26, 1918, taken prisoner same day.

Member: Board of Governors, National Aeronautic Association; Capital City Club of Atlanta; Pres., Atlanta Air Board.

Present Occupation: General Agent, Southern States Life Insurance Co.

Address: 217 Healey Bldg., Box 1148, Atlanta Ga.; home, 175 East 17th St., Atlanta, Ga.

John Barry Cary

CARY, JOHN BARRY, Life Insurance; born, Richmond, Va., Feb. 27, 1886; son of T. Archibald Cary and Maria A. Cary; married, Katherine R. Gordon, Nov. 17, 1917.

Educated: Richmond Public Schools; McCabe's University School; Richmond College; V. P. I., B. S. in civil engineering.

Professional: Agent, Northwestern Mutual Life, 1909-1916; agent, Travelers Insurance Co., 1919-1921; general agent, Pennsylvania Mutual Life Insurance Co., 1921 to date.

Aeronautical Activities: Observation School, Post Field, Okla., Apr. 15, 1918 to June 20, 1918; Selfridge Field Aerial Gunnery School, July 1918; overseas Aug. 1918; Chatillon-sur-Seine Observers School, Sept. 1918; 8th Aero Squadron, 6th Corps Observation Group; Observer Oct. 1918 until after the Armistice.

Flying Rating: Aerial Observer, June 20, 1918; A. E. F. rating as observer, Nov. 3, 1918.

War Service: June 21, 1916 Border Service with National Guard, Commissioned 1st Lt., Inf. 1st R.O.F.C. Fort Myers; App't. Adjutant, 1st Br. 317 Inf. 80th Division.

Member: Country Club of Virginia.

Present Occupation: Diggs and Cary, General Agents, Pennsylvania Mutual Life Insurance Co.

Address: 604-7 Mutual Bldg., Richmond, Va.; home, 1704 Park Ave., Richmond, Va.

Israel Ludlow

LUDLOW, ISRAEL, Attorney at Law; born, Austin, Tex., Apr. 23, 1874; son of Benjamin Chambers Ludlow and Frances A. (Jones) Ludlow.

Educated: University of Michigan, LLB 1895.

Professional: Lawyer, writer and in business in New York since 1895.

Aeronautical Activities: Pioneer experimenter in aviation; made many record gliding and towed flights during 1905 and 1906; in one of these towed flights Charles K. Hamilton, professional aeronaut, attained a height of 600 ft. over the Hudson River when drawn by a fast tug boat; was severely injured in flying tests at Daytona Beach, Fla. in 1906.

Books Written: "Navigating the Air."

Member: Aero Club of America, Society of Automotive Engineers.

Present Occupation: President, Aeronautical Equipment Inc.

Address: 522 Fifth Ave., New York; home, 709 West End Ave., New York.

Dudley Miller Outcalt

OUTCALT, DUDLEY MILLER, Attorney at Law; born, Cincinnati, Ohio, May 8, 1897; son of Dudley C. Outcalt and Mary Louise (Black) Outcalt; married, Louisa Katherine Crook, Sept. 25, 1920.

Educated: Cincinnati Grade School; Walnut Hills High School; University of Cincinnati, A.B. 1918; Cincinnati College of Law.

Professional: Practiced law 1920 to date.

Aeronautical Activities: Enlisted Cadet, A.S. S.O.R.C., Sept. 1917; Columbus, Ohio Ground School, Oct. 4, 1917; flying training Rockwell Field, Dec. 1917 to Feb. 1918; flying training Issoudun, Mar. 15, 1918 to Apr. 15, 1918; pilot, School of Observation, Tours; connected with 90th, 141st, 95th and 94th Aero Squadrons flying over lines with the 94th Aero Squadron; Vice president of the Grisard Field Co., landing field company of Cincinnati.

Flying Rating: Reserve Military Aviator, Feb. 2, 1918; F.A.I. Aviator's Certificate, Mar. 1918.

War Service: Private MG Co. 147th U. S. Infantry, Apr. 22, 1917 to Sept. 17, 1917; enlisted Cadet, A.S.S.O.R.C., Sept. 1917; served with squadrons above mentioned as pilot; 2nd Lieut. Air Service, Feb. 2, 1918; Army of Occupation, Nov. 15, 1918 to Apr. 15, 1919; discharged, June 9, 1919.

Member: National Aeronautic Association; Charter Mem. and Gov., National Air Association; American Legion; Cincinnati Bar Association; Lawyer's Club of Cincinnati.

Present Occupation: Attorney at Law.

Address: 302 Telephone Bldg., Cincinnati, Ohio; home, 6549 Iris Ave., Cincinnati, Ohio.

Clinton Goodloe Edgar

EDGAR, CLINTON GOODLOE, Sugar Merchant; born, Detroit, Mich., Dec. 21, 1873; son of James Edgar and Mary (Goodloe) Edgar; married, Mary McComas, Dec. 5, 1900.

Educated: Public schools of Detroit; Michigan Military Academy; Cornell University, B.S. 1897.

Professional: Ass't Supt., Detroit Gas Works, 1897-1898; W. H. Edgar & Son, 1898 to date; President, Continental Sugar Co.; President, First National Bank Building Co.

Aeronautical Activities: Entered service as Captain in Quartermaster Reserve Corps, Apr. 28, 1917; resigned June 11, 1917; re-entered service June 21, 1917; placed in charge of Construction Division, Signal Corps, Sept. 4, 1917; promoted to Lieut. Col., Signal Corps, Dec. 9, 1917; promoted to Colonel in charge of Supply Section, Dept. of Military Aeronautics; resigned Feb. 8, 1919; Chief of Supply, Air Service, 1918-1919; appointed Col. in Officers' Reserve Corps, Dec. 7, 1920; promoted to Brigadier-General, July 5, 1922.

War Service: Apr. 1917 to Feb. 1919.

Honors: Crown of Italy.

Member: Detroit Club; Detroit Athletic Club; Country Club; Metropolitan Club, N. Y.; Army & Navy Club, Wash.

Present Occupation: W. H. Edgar & Son.

Address: 1924 Lafayette Blvd., Detroit, Mich.; home, 866 Iroquois Ave., Detroit, Mich.

Ralph Johnson Mitchell

MITCHELL, RALPH JOHNSON, Captain, U. S. Marine Corps; born, New Britain, Conn., Sept. 25, 1891; son of Thomas W. Mitchell and Hattie J. Mitchell; married, Belle T. Mitchell, June 5, 1915.

Educated: Normal School and High School of New Britain; U. S. Naval Academy.

Aeronautical Activities: Student, Naval Air Station, Pensacola, Fla., Nov. 1920 to July 1921; qualified as Naval Aviator, June 1921; student, Air Service Pilot School, Arcadia, Fla., Aug. 1921 to Sept. 1921; commanding Air Station, Guam, Nov. 1921 to date.

Flying Rating: Naval Aviator, June 6, 1921.

War Service: Marine Corps, June 5, 1915 to date.

Member: Navy Athletic Association.

Present Occupation: Captain, U. S. Marine Corps.

Address: Guam Islands; home, 80 Vine Street, New Britain, Conn.

ARMY AND NAVY AIR NEWS

Air Service

General Pershing Points Out Needs of Air Service—In his annual report General Pershing, Chief of Staff, endorses the comments of Major General Patrick, Chief of Air Service, pointing out "the present shortage of facilities and personnel for a completely balanced and adequate service of this vital component of defense."

"No man can estimate with present certainty the value which can be ascribed in a few years to the possession of an resourcefulness of the air," General Pershing states. "It is certain, however," he adds, "that the influence of air-power will become increasingly great and that the nation cannot afford to neglect this arm. The Air Service which we develop should be capable of offensive application. This does not mean that we must immediately build an Air Service that could take the offensive against any great power or group of powers. It does mean however that we should have a force that can take the immediate defensive, and that can, during a reasonable period of operations, expand to the strength required for an offensive. This is the basis of our present defense policies with all our arms and should be considered a minimum. A very important part in such a defensive would be the operation of an effective Air Service. We must not only be training our fliers for reserve but we must actually make provision for a strength in serviceable planes which can meet this requirement. This reserve of planes we now lack, as we lack even the facilities for training the necessary reserve of personnel. The industries and the airways of our country are not prepared for an emergency. I earnestly hope therefore that early steps be taken to bring about the effective cooperation of States with the agencies of the National Government to the end that this vital need can be effectively filled."

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Landing Minus a Wheel—Capt. L. P. Hickey while flying at Chanute Field, Rantoul, Ill., had an experience which shows how cooperative action will prevent serious accidents under certain circumstances.

Captain Hickey had been stunting over the field and had followed a DeHaviland airplane a short distance southwest when mechanics on the ground saw something fall from the plane. It was at first supposed to be a seat cushion, but as the plane came in to land, it was observed that the left wheel was missing. Staff Sergeant Wilson and Master Sergeant Frang Covell brought extra wheels from the hangars and held them above their heads in an effort to signal the pilot. Captain Hickey noticed the activity on the ground and realizing that something was wrong circled the field at a low altitude. This gave the men on the ground time to roll a car out on the field and place a wheel on its left hand side. Captain Hickey circled again and headed due east.

There was some conjecture as to where he had gone but the general opinion was that the Wabash river was the pilot's objective and that he intended to attempt a landing on the water rather than risk an almost certain crash landing the disabled ship on the field.

Indeed, Captain Hickey picked an open stretch in the river almost opposite the city of Covington, and glided down with the intention of landing in the shallow water near the shore. Before the plane touched the surface he freed himself of the safety belt. When the machine struck the water the nose went under at once and the tail flew up literally catapulting the pilot clear.

The pilot was soon picked up by brother pilots and flown back to the field.

Aeronautical Museum at McCook Field—Within the course of the next few months the Air Service Engineering Division at McCook Field, Dayton, Ohio, will be augmented by a most unique collection of aircraft and accessories, thereby affording those interested in working out new designs of airplanes and engines a means of obtaining detailed information concerning the design and features of different types of same.

This museum will occupy four new buildings at the extreme north end of McCook Field and will have a total floor space of 24,600 sq. ft. In the engine department, which will occupy an entire building, there will be displayed some sixty-three different types of engines, ranging from 2 to 18 cylinders of both air and water-cooled types. Two engines of each type will be displayed, one completely assembled and the other entirely disassembled, thereby making every part of the engine available for inspection and measurement.

The airplane exhibit will include various types of bombardment, training, and pursuit airplanes of both foreign and domestic design, so arranged that a comparison of the airplanes used by the different countries for the same purpose can be easily made. As in the case of the engines, various parts of the planes will be shown in an assembled and disassembled state, thus making it possible to easily observe the details of their construction.

Library tables and chairs will be placed conveniently near these exhibits and one may obtain access to bound documents containing very comprehensive data relative to design and performance. An aeronautical engineer of wide practical experience will be in charge of the exhibits, and will gladly render every possible assistance to prospective designers and others interested in aviation in securing any available information.

Officials of the Engineering Division at McCook Field are of the opinion that the Museum will prove a great aid to engineers of the Air Service, and state that manufacturers of airplanes, aeronautical engineers engaged in civil practice, and others interested in the science of aviation will also be welcome and the resources of the museum will be placed at their disposal.

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Plane Missing from Rockwell Field—Reports from Rockwell Field state that Colonel Marshall, Cavalry, and Lieutenant Webber, A.S., left that field for Tucson at 9.15 a. m. Dec. 7, but that no report of their arrival had been received on Dec. 8. Colonel Arnold in his report to Washington stated that he was endeavoring to check the towns over which these fliers had passed and had dispatched two planes to secure additional information. The Weather Bureau had reported low clouds over the west Imperial Valley and broken clouds over the remainder of the trip.

Coming Aeronautical Events

FOREIGN

1923

Dec. 15-Jan. 2 — *8th International Aeronautic Exposition, Paris France.*

June — *International Aero Congress, London.*

July 20-Aug. 12 — *International Aero Exhibition, Gothenburg, Sweden.*

Naval Aviation

Aviation as an Integral Part of the Fleet—The following reference to Naval Aviation in the annual report of the Secretary of the Navy is of interest as it shows the importance the aeronautical arm has attained in the naval service:

"The development of aviation as an integral part of the fleet, with types of aircraft suited to every need of the naval forces, has been the outstanding feature of the past year in naval aeronautics. The rapid strides that have been made in organization and development work have fully justified the establishment of the Bureau of Aeronautics, and the work of this bureau is also reflected in the general contribution that has been made to the advancement of industrial and commercial aviation in this country.

"The catapulting of a service type seaplane from the deck of the U.S.S. Maryland is a forerunner of providing aerial defense to every type of surface ship, and the catapult developed by the Navy will find a wide commercial application in the future. The conversion of two battle cruisers under construction into aircraft carriers has been recently authorized by Congress and may be cited as the most progressive step yet taken to place aircraft with the fleet. The production of helium gas from July to November of 1921, at the United States helium production plant No. 1, was a help to lighter-than-air development, and preceded the first flight in the history of the world of an airship filled with helium gas—that of the C7 from the naval air station, Hampton Roads, Va., to Washington, D. C., and return.

"The construction of fleet airship No. 1 at the naval air station, Lakehurst, N. J., is estimated at more than 60 per cent complete, and contracts have been signed for acquisition by the United States of a 70,000 cubic meter airship to be delivered by the German Government on reparations account. The importance of airship development by the Navy will be felt in commercial and industrial enterprise.

"The successful developemnt of torpedo-carrying seaplanes and of ship planes, and the commissioning of our first airplane carrier, the Langley, are also outstanding features of the year.

"These and other aeronautical accomplishments brought to a successful conclusion during the past year, have been consummated, in conformity with the aviation policy enunciated in my last year's report, to place an adequate air force in the fleet as an integral part of it, and to operate with it at any time, wherever it may be."

* * *

Commended for Bravery—The Secretary of the Navy has commended 1st Lieut. W. G. Farrell, U. S. Marine Corps, Lieut. H. B. Sallada, and R. S. Price, Amle, U. S. N. for the attempted rescue of Ensign A. O. Harrington from the wreck of the N9 type Seaplane No. 2591 on Sept. 25, 1922, after the plane had crashed:

The report of the Senior Squadron Commander, Naval Air Station, Pensacola, stated that:

"Both the officers and man arrived in planes on the scene of the crash before the rescue boat. They immediately went overboard and tried to extricate the body of the pilot, which was an extremely hazardous undertaking due to the fact that the wreckage was a mass of broken spars, tangled wires and fabric, completely submerged except for the tail surfaces. They worked untiringly and only desisted after the arrival of the wrecking barge. They further helped in raising the wreck by diving and passing lines through the fuselage to which the wrecking barge could hook."

* * *

Naval Orders—Ens. William J. Walker, det. Nav. Air Sta. Pearl Harbor, T. H.; to Rec. Ship, San Francisco.

Lieut. Lawrence B. Richardson (C.C.), det. Office, General Inspector of Aircraft, Garden City, L. I.; to Inspector of Naval Aircraft, L.W.F. Eng'g Corp., College Point, L. I.

Lieut. William D. Thomas, to command Nav. Air Sta. Anacostia, D C.

Lt. Comdr. Agustine H. Gray, det. U.S.S. Utah; to Naval Aircraft Factory, Philadelphia.

Lieut. John B. Lawrence, det Kite Balloon Sqd. 1; to Nav. Air Sta. Hampton Roads, Va.

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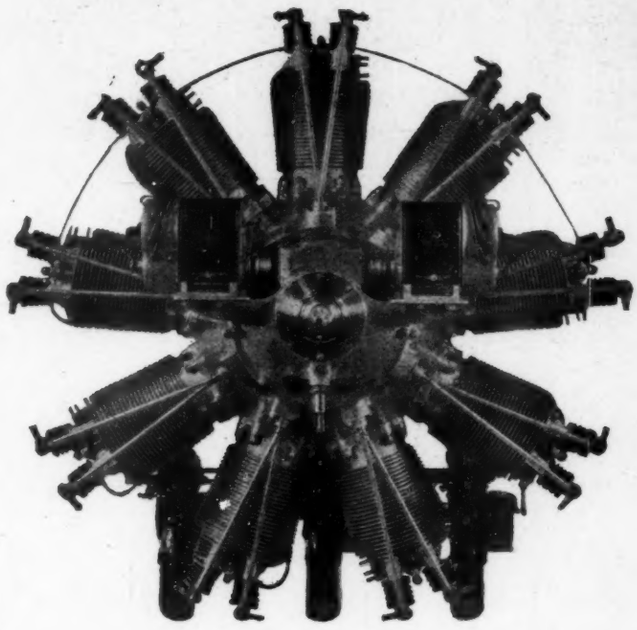

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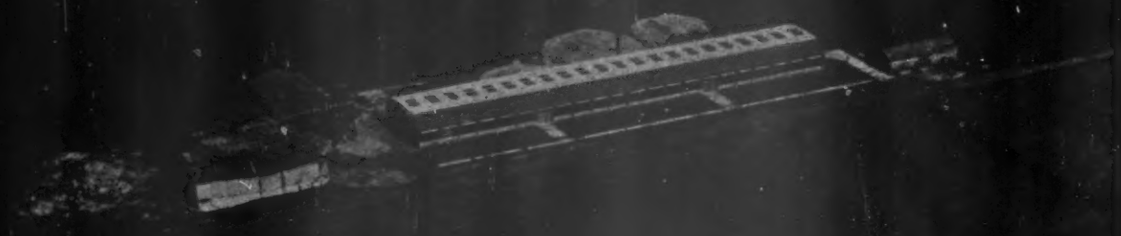

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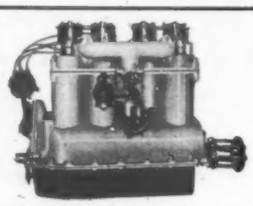

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